



FEMA

Volume 17, No. 7
July, 2005

REGION 6 Preparedness, Response, and Prevention Update

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Despite Progress, Chemical Spills Persist by Carolyn W.

Merritt, *Chemical Emergency Preparedness & Prevention Update*, February 2005.

Silently after nightfall, an uncontrolled chemical reaction began in a vessel holding thousands of pounds of toxic substances. Gas pressure began to build, opening a safety device designed to protect the vessel from bursting. However, the chemical plant lacked equipment to contain the release, and a cloud of unidentified gases began wafting through nearby neighborhoods.

By the time sleepy residents realized what was happening, many had been exposed. Emergency responders, lacking the proper equipment and experience, alerted residents by going door to door and struggled to help the contaminated and the sick reach the nearest hospital.

These were the actual events of April 12, 2004, in the northwest Georgia community of Dalton. But to those of us who study chemical-process safety, there are eerie similarities to the events of December 3, 1984 in Bhopal, India, where an uncontrolled release of 90,000 pounds of methyl isocyanate gas from a US-owned chemical plant immediately killed several thousand residents – and ultimately thousands more – and shocked the world.

Fortunately, the gas release in Dalton was smaller and less toxic, the area around the plant was less densely settled than Bhopal, and a fortuitous rainstorm helped suppress the hazardous fumes. While 154 Dalton residents were sent to the hospital for evaluation, none died.

Nevertheless, the incident illustrates that 20 years after the Bhopal tragedy,

inattention to chemical safety can still threaten the public with a devastating impact. Are we doing enough to prevent such accidents? I have been thinking about this question a great deal since returning recently from a conference in Kanpur, India, to examine the causes and consequences of Bhopal on the 20th anniversary of the accident. The agency I head, the US Chemical Safety and Hazard Investigation Board (CSB), is one of Bhopal's many legacies, established by Congress to independently investigate significant chemical accidents, determine root causes, and make recommendations to prevent future accidents.

Our investigations of major accidents provide persuasive evidence that serious safety problems still exist among some US operations that store, use, or produce chemicals. The problems often occur at smaller businesses that may lack substantial safety expertise or receive less frequent oversight from regulators. A striking example was the chemical explosion at a small sign making company in Manhattan two years ago, which injured 36. Elsewhere, we have seen employers using untrained workers to handle highly hazardous materials, workplaces where critical safety equipment is absent or in disrepair, and emergency-response plans that leave nearby residents confused about what to do.

There have been significant

regulatory changes and other improvements in the past 20 years, and both industry and government continue to look at chemical safety issues in light of the September 11 attacks. Among new federal rules are chemical process safety regulations adopted by the Occupational Safety and Health Administration in 1992 and the Environmental Protection Agency in 1996. Industry has developed its own voluntary standards as well such as the American Chemistry Council's Responsible Care program, which commits members to environmental and safety principles and community outreach. These efforts have had positive effects.

But substantial challenges remain. Not all companies join voluntary programs, and not all voluntary programs result in verifiable improvements. In addition, federal process-safety regulations still do not address the cause of many chemical accidents. Prompted by tragedies in Lodi and Paterson, N.J., in the 1990s, the CSB conducted a study of 167 serious accidents in the US involving uncontrolled reactions since 1980. The study found that more than half of these accidents involved chemicals not covered by process-safety regulations, and we therefore recommended broadening those rules.

Around the country, accidents continue to kill or injure workers, impact communities, and in some cases have the potential for wider destruction. Last April, at a plastics production plant in central Illinois, five workers were killed and others were seriously injured when flammable vinyl chloride leaked, ignited, and exploded near a production unit. An emergency system designed to suppress the vinyl chloride vapor cloud malfunctioned.

At a chlorine repackaging plant near St. Louis two years ago, a transfer hose burst and none of the plant's four automated emergency shutoff valves closed. The result was a 48,000-pound chlorine gas release, which imperiled a mobile home community.

As in Dalton, Ga., neither the community nor the plant had emergency sirens or automated telephone alert systems, and firefighters had to go door to door to alert residents to evacuate.

Indeed, a common finding is that plants and local emergency response organizations often lack any effective means to notify nearby communities about major chemical accidents. Furthermore, despite increased funding for homeland security, some jurisdictions remain unable to provide firefighters and police with the training and equipment needed to respond to a toxic chemical emergency.

Sometimes it has been good fortune rather than sound planning that has prevented chemical accidents from jeopardizing lives. At a south Mississippi petrochemical complex two years ago, a massive explosion blew apart a 145-foot distillation tower, hurling heavy debris into the air and igniting fires. When CSB investigators reached the site, they found that metal debris had missed an anhydrous ammonia storage vessel by just a few feet.

Most US chemical plants are run in a safe and conscientious manner. But until all companies live up to the same high standards, we will continue to experience major chemical accidents. It is up to all firms that use and produce chemicals to eliminate known hazards, to develop and maintain a positive safety culture, and to educate customers about accident risks.

As a result of the Bhopal accident, thousands died and tens of thousands more were injured. That nightmare could have been avoided the same way accidents today can be avoided: through meticulous commitment to safety at every step of the process. Twenty years after Bhopal, we owe those victims - and our own workers and communities - no less.

What if Hurricane Ivan Had Not Missed New Orleans? By Shirley Laska, *Natural Hazards Observer*, November 2004

What if Ivan Had Hit New Orleans?

New Orleans was spared, this time, but had it not been, Hurricane Ivan would have:

- Pushed a 17-foot storm surge into Lake Pontchartrain;
- Caused the levees between the lake and the city to overtop and fill the city "bowl" with water from lake levee to river levee, in some places as deep as 20 feet;
- Flooded the north shore suburbs of Lake Pontchartrain with waters pushing as much as seven miles inland; and
- Inundated inhabited areas south of the Mississippi River.

Up to 80 percent of the structures in these flooded areas would have been severely damaged from wind and water. The potential for such extensive flooding and the resulting damage is the result of a levee system that is unable to keep up with the increasing flood threats from a rapidly eroding coastline and thus unable to protect the ever-subsiding landscape.

Evacuation Challenges

Researchers have estimated that prior to a “big one,” approximately 700,000 residents of the greater New Orleans area (out of 1.2 million) would evacuate. In the case of Hurricane Ivan, officials estimate that up to 600, 000 evacuated from metropolitan New Orleans between day-break on Monday, September 13 and noon on Wednesday, September 15, when the storm turned and major roads finally started to clear.

To aid in the evacuation, transportation officials instituted contraflow evacuation for the first time in the area’s history whereby both lanes of a 12-mile stretch of Interstate 10 were used to facilitate the significantly increased outbound flow of traffic toward the northwest and Baton Rouge. The distance of the contraflow was limited due to state police concerns about the need for staff to close the exits. And, although officials were initially pleased with the results, evacuees felt the short distance merely shifted the location of the major jams.

These feelings were justified by the amount of time it took residents to evacuate – up to 11 hours to go the distance usually traveled in less than 1.5. For many who evacuated into Texas, total evacuation time frequently exceeded 20 hours. Since the storm, a consensus has developed that to alleviate this congestion much more secondary highway coordination is necessary throughout the state, contraflow needs to be considered for much greater distances, residents who are able and willing to evacuate early must be doubly encouraged to do so, families with multiple cars need to be discouraged from taking more than one unless they are needed to accommodate evacuees, and all modes of transportation in their various configurations must be fully considered for the contributions they can make to a safe and effective evacuation.

The major challenge to evacuation is the extremely limited number of evacuation routes, which is the result of the same topography and hydrology responsible for the area’s high level of hurricane risk. The presence of the Mississippi River, several lakes and bays, and associated marshes and swamps necessitates very expensive roadway construction techniques that are generally destructive to the environment, making the addition of more arteries increasingly challenging. This problem of limited evacuation routes also plagues the rest of the delta plain of southeast and south central Louisiana.

The fact that 600, 000 residents evacuated means an equal number did not. Recent evacuation surveys show that two thirds of the nonevacuees with the means to evacuate chose not to leave because they felt safe in their homes. Other nonevacuees with means relied on a cultural tradition of not leaving or were discouraged by negative experiences with past evacuations.

For those without means, the medically challenged, residents without personal transportation, and the homeless, evacuation requires significant assistance. The medically challenged often rely on life support equipment and are in such fragile states of health that they can only be moved short distances to medically equipped shelters. While a large storm-resistant structure with appropriate equipment has yet to be constructed or retrofitted, the Superdome was used to shelter nonevacuees during Ivan.

Residents who did not have personal transportation were unable to evacuate even if they wanted to. Approximately 120,000 residents (51, 000 housing units X 2.4 persons/unit) do not have cars. A proposal made after the evacuation for Hurricane George to use public transit buses to assist in their evacuation out of the city was not implemented for Ivan. If Ivan had struck New Orleans directly it is estimated that 40-60,000 residents of the area would have perished.

Unwilling to merely accept this reality, emergency managers and representatives of nongovernmental disaster organizations, local universities, and faith based organizations have formed a working group to engage additional faith-based organizations in developing ride-sharing programs between congregation members with cars and those without. In the wake of Ivan’s near miss, the faith-based initiative has become a catalyst in the movement to make evacuation assistance for marginalized groups (those without means of evacuation) a top priority for all levels of government.

To The Rescue

If a hurricane of a magnitude similar to Ivan does strike New Orleans, the challenges surrounding rescue efforts for those who have not evacuated will be different from other coastal areas. Rescue teams would have to don special breathing equipment to protect themselves from floodwaters contaminated with chemicals and toxins released from commercial sources within the city and the petrochemical plants that dot the river's edge. Additionally, tank cars carrying hazardous materials, which constantly pass through the city, would likely be damaged, leaking their contents into the floodwater and adding to the "brew." The floodwater could become so polluted that the Environmental Protection Agency might consider it to be hazardous waste and prohibit it from being pumped out of the leveed areas into the lake and marshes until treated.

Regional and national rescue resources would have to respond as rapidly as possible and would require augmentation by local private vessels (assuming some survived). And, even with this help, federal and state governments have estimated that it would take 10 days to rescue all those stranded within the city. No shelters within the city would be free of risk from rising water. Because of this threat, the American Red Cross will not open shelters in New Orleans during hurricanes greater than category 2; staffing them would put employees and volunteers at risk. For Ivan, only the Superdome was made available as a refuge of last resort for the medically challenged and the homeless.

The Aftermath

In this hypothetical storm scenario, it is estimated that it would take nine weeks to pump the water out of the city, and only then could assessments begin to determine what buildings were habitable or salvageable. Sewer, water, and the extensive forced drainage pumping systems would be damaged. National authorities would be scrambling to build tent cities to house the hundreds of thousands of refugees unable to return to their homes and without other relocation options. In the aftermath of such a disaster, New Orleans would be dramatically different, and likely extremely diminished, from what it is today. Unlike the post-hurricane development surges that have occurred in coastal beach communities; the cost of rebuilding the city of New Orleans' dramatically damaged infrastructure would reduce the likelihood of a similar economic recovery. And, the unique culture of this American original that contributed jazz and so much more to the American culture would be lost.

Accepting the Reality

Should this disaster become a reality, it would undoubtedly be one of the greatest disasters, if not the greatest, to hit the United States, with estimated costs exceeding 100 billion dollars. According to the American Red Cross, such an event could be even more devastating than a major earthquake in California. Survivors would have to endure conditions never before experienced in a North American disaster.

Loss of the coastal marshes that dampened earlier storm surges puts the city at increasing risk to hurricanes. Eight years of substantial river leveeing has prevented spring flood deposition of new layers of sediment into the marshes, and a similarly lengthy period of marsh excavation activities related to oil and gas exploration and transportation canals for the petrochemical industry have threatened marsh integrity. Sea level rise is expected to further accelerate the loss of these valuable coastal wetlands, the loss of which jeopardizes the fabric of Louisiana communities by threatening the harvesting of natural resources, an integral part of coastal culture. Concerted efforts by state and federal agencies are underway to develop appropriate restoration technologies and adequate funding to implement them.

The Future is Now

These solutions may not be able to overtake the speed of coastal loss. Strong storms not only threaten human lives, but also the physical coast itself. National hurricane experts predict more active and powerful hurricane seasons in the Atlantic basin for the next 10-40 years. The hurricane scenario for New Orleans that these converging risks portend is almost unimaginable. Hurricane Ivan had the potential to make the unthinkable a reality. Next time New Orleans may not be so fortunate.

Emergency Numbers for Spill Reporting in Region 6

Arkansas Dept. of Emergency Management	800-322-4012
Louisiana State Police	877-925-6595
New Mexico State Police	505-827-9126
Oklahoma Dept. of Environmental Quality	800-522-0206
Texas Environmental Hotline	800-832-8224

National Response Center	800-424-8802
EPA Region 6	877-372-7745
CHEMTREC	800-424-9300

2003 Toxics Release Inventory Shows Continued Decline in Chemical Releases, *EPANews*; May 11, 2005

EPA's 2003 Toxics Release Inventory (TRI), issued on May 11, 2005 showed that the amount of toxic chemicals released into the environment by reporting facilities continues to decline, with total reductions since 1998 and a six percent decrease from 2002 to 2003.

TRI provides the American public with vital information on chemical releases including disposal for their communities, and is an important instrument for industries to gauge their progress in reducing pollution. Over 23,000 facilities reported on approximately 650 chemicals for the calendar year 2003.

TRI reporting includes toxics managed in landfills and underground injection wells as well as those released into water and air. The EPA continues to make progress on electronic reporting by facilities this year, making it possible to release the data to the public more quickly. Eighty-six percent of reports were submitted electronically. The data released on May 11, 2005 and analyzed at the national

level was released on a facility-specific basis last November.

TRI tracks the chemicals and industrial sectors specified by the Emergency Right to Know Act of 1986 and its amendments. The Prevention Pollution Act (PPA) of 1990 also mandates that TRI collect data on toxic chemicals treated on-site, recycled, and burned for energy recovery. Together, these laws require facilities in certain industry to report annually on releases, disposal and other waste management activities related to these chemicals.

There are certain increases in mercury, PCBs and dioxin in the 2003 TRI data. Some of these increases are due to reporting anomalies. For more information please see analyses on the EPA's web site that provide context for understanding the full picture presented by the 2003 data.

www.epa.gov/tri/tridata/tri03/index.htm

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CAMEO CORNER

1a.) What chemical has the general description “green powder”, a health hazard that states “ingestion causes anxiety”, and a fire hazard that states “gas may form in fires”?

1b.) What gas is a by-product of this chemical by either decomposition or as a result of fire?

ALOHA EXERCISE

Using the answer from question 1b, create an ALOHA footprint for the following scenario.

A canister of the above mentioned chemical was dislodged from a transport vehicle when it collided with a concrete dividing wall on I-10. The resulting collision of the canister with the ground caused the valve to be sheared off and released the entire contents in the amount of 500 pounds on July 13, 2004 in Beaumont, Texas at 2:37pm. The wind speed was 16 mph from the NE as measured by the National Weather Service at a height of 10 meters. The air temperature was 97 degrees F with 85% humidity and no inversion. The surrounding area is urban and that day it was partly cloudy. As the chemical is a gas the release was direct, instantaneous and rose from the ground.

2a) what is the downwind distance of the AEGL-1?

2b) what was the release rate?

CAMEO/ ALOHA ANSWERES: 1a.) Copper Cyanide; 1b.) Hydrogen Cyanide; 2a.) 1.4 miles;
2b.) 8.33 pounds/sec

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STRESS MANAGEMENT

A lecturer, when explaining stress management to an audience, raised a glass of water held in his right hand and asked, "How heavy is this glass of water"?

Answers called out ranged from 20g to 500g. The lecturer replied, "The absolute weight doesn't matter. It depends on how long you try to hold it. If I hold it for a minute, that's not a problem. If I hold it for an hour, I'll have an ache in my right arm. If I hold it for a day, you'll have to call an ambulance. In each case, it's the same weight, but the longer I hold it, the heavier it becomes. And that's the way it is with stress management. If we carry our burdens all the time, as the burden becomes increasingly heavy, we won't be able to carry on. As with the glass of water, you have to put it down for a while and rest before holding it again. When we're refreshed, we can carry on with the burden. So, before you return home tonight, put the burden of work down. Don't carry it home. You can pick it up tomorrow. Whatever burdens you're carrying right now, let them down for a moment if you can. Relax; pick them up later after you've rested. Life is short. Enjoy it!"

The lecturer then shared some ways of dealing with the burdens of life:

- Accept that some days you're the pigeon, some days you're the statue.
- Always keep your words soft and sweet, in case you have to eat them.
- Always read stuff that will make you look good in case you die in the middle of it.
- Drive carefully. It's not only cars that can be recalled by their maker.
- If you can't be kind, at least have the decency to be vague.
- If you lend someone \$20 and never see that person again, it was probably worth it.
- Your sole purpose in life is simply to serve as a warning to others.
- Never buy a car you can't push.
- Never put both feet in your mouth at the same time, because then you won't have a leg to stand on.
- Nobody cares if you can't dance well. Just get up and dance.
- Since it's the early worm that gets eaten by the bird, sleep late.
- The second mouse gets the cheese.
- When everything's coming your way, you're in the wrong lane.
- Birthdays are good for you. The more you have, the longer you live.
- You may only be one person in the world, but you may also be the world to one person.
- Some mistakes are too much fun to only make once.
- We could learn a lot from crayons. Some are sharp, some are pretty and some are dull.
Some have weird names, and all are different colors, but they all live in the same box.
- A truly happy person is one who can enjoy the scenery on a detour.